
TELEPHONE EQUIPMENT
and
SERVICES

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CORDLESS P.B.X. SWITCHBOARD

Cordless P. B. X. Switchboard

GENERAL

THE CORDLESS P.B.X. SWITCHBOARD is a cabinet or turret type board in which the connections are established by means of keys. It is designed for either manual or dial operation.

DESCRIPTION

All of the equipment which is necessary for the operation of the board is contained in the cabinet which may be placed on a table, desk or shelf.

The dimensions of the cabinet are: 1 foot 4 $\frac{1}{4}$ inches wide by 1 foot 3 inches deep, by 1 foot 2 $\frac{1}{2}$ inches high. Cordless boards are readily available finished in dark oak on red oak and dark red mahogany on birch. A limited supply is also available finished in golden oak on white oak and walnut on mahogany. Sample finishes are shown in Section 13.

A standard desk telephone for the attendant's set is provided. However a hand telephone is sometimes more convenient and may be used.

Battery and ringing current are usually supplied to the board on cable pairs from the central office.

Visual drops are provided for trunks and visual magnetic shutter type signals for station lines. A buzzer can be associated with the visual drops and signals for providing audible signals. A magnetic supervisory signal is provided for each connecting circuit.

The cabinet can be placed against the wall, as access to the equipment can be had through the hinged front and removable cover or top.

CAPACITY

The maximum capacity of the board is three central office trunk lines and seven station lines. Tie lines may be provided to terminate either on trunk keys or extension keys, reducing the trunk or station capacity correspondingly. The attendant's telephone is not considered as a station.

The board has a maximum capacity for setting up five connections, which is a sufficient number to connect all station lines and trunks simultaneously.

OPERATION

Incoming calls from stations are indicated by the shutter type station signals, which are located above station keys. Incoming calls from central office trunks are indicated by the trunk drop signals, which are located above the trunk keys.

Connections are made between two stations, or between a station and a trunk by moving the associated keys in the same horizontal row to the same position.

Night connections may be established, the maximum number of connections being determined by the number of trunks.

When the board is operated from a dial central office, the attendant's telephone is equipped with a dial. The other stations may also be equipped with dials, if desired. Dialing may be done either by the P.B.X. attendant or from a dial equipped extension station after trunk connection is established by the attendant.

USES AND ARRANGEMENTS

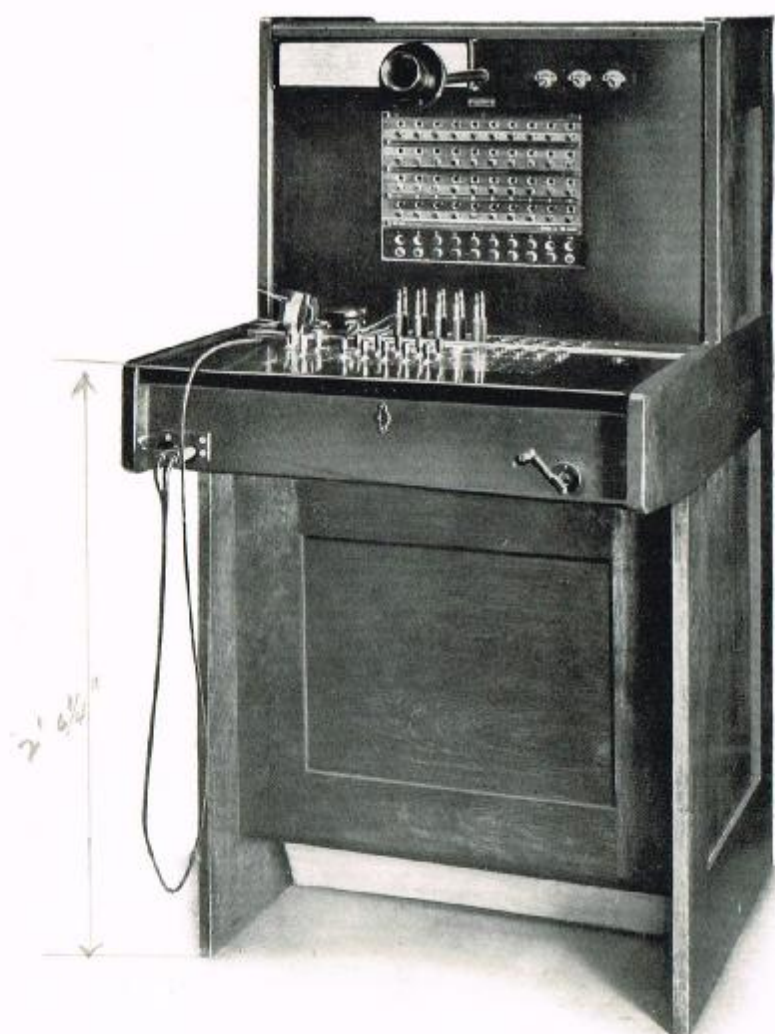
1. The cordless board has a low station and trunk capacity. It provides for a larger capacity, however, than can be handled conveniently by a wiring plan arrangement. In each installation, consideration should be given to the probable expansion of the customer's service. Although the board is easy to install and move, if its capacity will likely be exceeded in a short time, a small capacity cord switchboard should be put in on the original installation.

2. A cordless P.B.X. enables the person calling the listed telephone number of the P.B.X. to be connected to any station. This eliminates frequent situations, when individual lines are used, of listing several numbers in the directory and expecting the person calling to select the correct number. Under such conditions, if the wrong number is selected the person calling must either hang up and call again, or the person wanted must suffer an inconvenience in reaching the called telephone.

3. Rapid and efficient intercommunication can be had between any two stations. Intercommunication does not affect the central office trunks, leaving them open for incoming or outgoing calls.

4. Fewer trunks per station are needed to furnish proper telephone service than is required when individual lines and extensions are used. This is due to the flexibility of the board, which enables the attendant to connect any station line with any trunk.

5. Twenty-four hour service can be provided on as many station lines as there are central office trunks, the lines being put up on night connections. Night and holiday directory listing can be provided for lines set up on night connections.



FORTY LINE NON-MULTIPLE
CORD P.B.X. SWITCHBOARD

KEY SHELF HEIGHT SAME ON 30 & 80 POS. SWDS
ON 2 POS. OR MORE AND 6" FOR PEDESTAL

August 1930

Non-Multiple Cord P. B. X. Switchboards

GENERAL

THE NON-MULTIPLE CORD P.B.X. Switchboard is a small board located on the customer's premises for distributing calls from the central office and for handling intercommunicating calls. It is made in two types, the 550 and 551. Both of these types are generally similar in appearance, the 551 type being of later design than the 550. The main difference is that the smallest 550 board has a 30 station line capacity while the smallest 551 board has a 40 station line capacity. Both types are designed for connection with manual or dial central offices.

DESCRIPTION

The cabinets housing the 551 boards have the following overall dimensions:

Station Line Capacity	Height	Width	Depth
40	3'10"	2'3/4"	2'5 1/4"
80-320	4'3 1/16"	2'2 7/8"	2'9 5/8"

The cabinet of the 550 type board has been manufactured in different sizes for boards of the same capacity. The measurements shown below can be used as a general guide and represent the maximum dimensions of any 550 type cabinet of the capacity shown.

Station Line Capacity	Height	Width	Depth
30	3'10"	2'2"	2'11"
80	4'3 1/16"	2'3 5/8"	2'11"
320	4'3 3/16"	2'4 1/4"	2'11 3/8"

The depth includes the depth of the key shelf which is approximately 1 foot, 3 inches.

Four standard finishes are available in quantities governed by local supply conditions, namely, dark oak on red oak, mahogany on birch, golden oak on white oak and walnut on mahogany. Sample finishes are shown in Section 13.

If the board is connected to a dial office, a dial is mounted on the key shelf, and the lamp cap of each dial equipped station has distinctive markings.

The trunk circuits terminate on the switchboard panel in the lower rows of jacks with the associated lamps directly below. The station circuits with associated lamps terminate in the upper rows of jacks.

The boards are equipped with a buzzer associated with the station, trunk, and back supervisory lamps for audible signals when the board is not closely attended.

The back of the board must be placed at least twenty-four inches from any wall to permit access to the equipment from the rear.

Talking and signaling battery and ringing

current are usually supplied to the board on cable pairs from the central office.

Either a chest set or a transmitter arm and head receiver set is standard equipment. From an operating standpoint the chest set is generally the most desirable on 80 and 320 station line boards.

CAPACITY

The 551 boards have the following capacity: A (1 panel) 40 station lines, 10 trunks, 10 cord pairs; B (2 panels) 80 to 320 station lines, 15 trunks, 15 cord pairs. The smallest 550 board has a 30 station line capacity. Otherwise the 550 boards have the same capacity as the 551 boards.

Two of the two-panel boards can be lined up together for two-position non-multiple operation but in this case must be mounted on a platform.

OPERATION

Calls originating over station lines or trunks are indicated at the board by line lamps. Connections between stations or between a trunk and a station are established by means of a cord circuit through which the operator rings the station and supervises the call.

Tie line circuits are usually terminated on the board in trunk jacks and tie line calls are handled in the same manner as trunk connections.

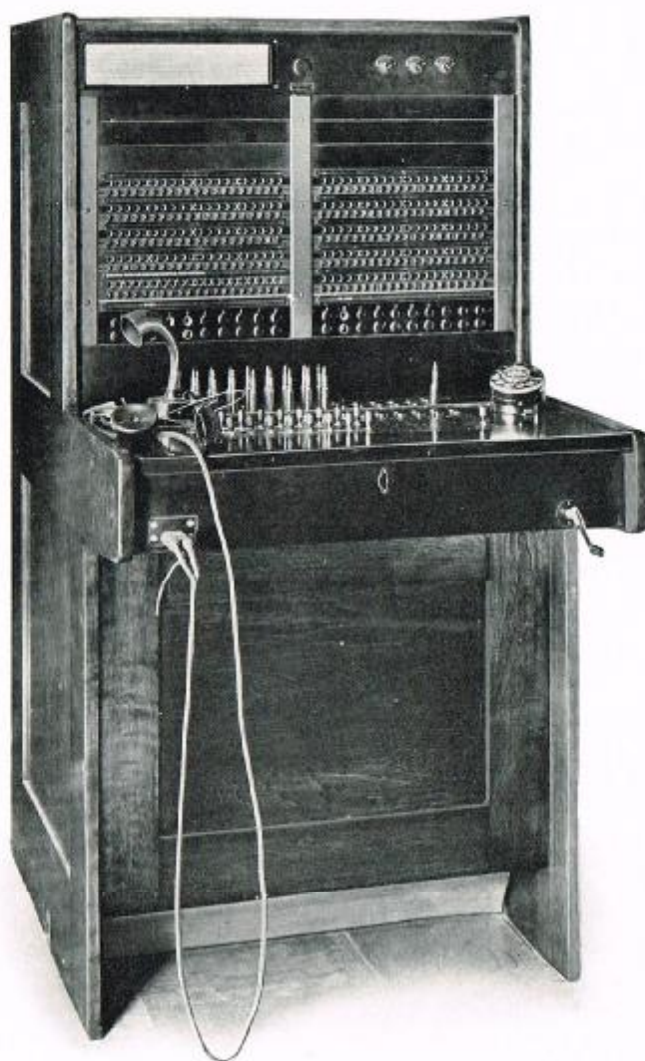
Night connections are established to a manual central office by setting up connections in the regular manner and by turning the battery cut-off and buzzer cut-off keys. Night connections to dial central offices are similar, except that the stations requiring outgoing night service must be equipped with dials.

USES AND ARRANGEMENTS

The three fundamental factors in non-multiple switchboard installations are: (1) The probable future station and trunk growth; (2) The amount and nature of the traffic; (3) The amount and nature of secretarial work required by the attendant.

1. The capacity of the initial switchboard installation should, under normal circumstances, care for the station and trunk growth for at least two years. If it is inadequate to do this, the customer must suffer an annoyance of having the switchboard replaced in a short time, which reflects unfavorably on the Company.

2. In commercial service studies on existing installations, the amount and nature of the traffic can be determined in a traffic study. In a new installation these must be estimated from conversations with the customer on the probable amount of long distance, intercommunicating



THREE HUNDRED TWENTY LINE
NON-MULTIPLE CORD P.B.X. SWITCHBOARD

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traffic, etc., and from a study of comparable installations in similar lines of business. Variations of a high calling rate and low station development, or vice versa, can be met by installing the different types of boards either individually or in pairs. For example, if the operating load is too heavy for one attendant but the number of station lines is relatively low, two positions of the 551B Board may best meet the situation.

3. In some cases the customer may want the attendant to do a certain amount of secretarial work on the calls, such as place some or all outgoing calls, stay on the line until incoming calls are completed, keep information on the location of officials, etc. Such work is frequently desirable in banks, legal offices, hospitals, clubs, and similar organizations. If some secretarial work is necessary to give the customer adequate telephone service, he should provide for it by relieving the attendant of some of her other duties or by providing an additional attendant. In general, such work as placing outgoing calls is unnecessary and undesirable, as it merely throws an additional burden on the attendant. There are no attendant's work units for calculating secretarial work, and the effect of the work on the attendant's load must be estimated from a general knowledge of the business and from comparable installations.

4. If the traffic load is light, the attendant may have time to act as "Information" or to do clerical work. Under any circumstances the work should

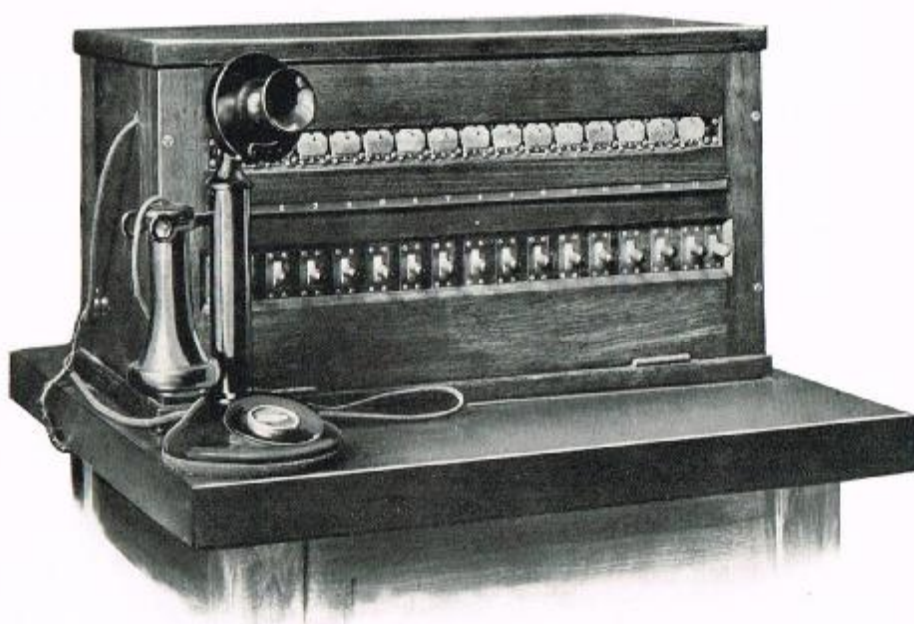
not be of a nature that would take the attendant from the board during business hours.

5. If all the attendant's time is required at the board, it should be located in a quiet place where the attendant is free from disturbances and interruptions. In selecting the location of the board, consideration should be given to proper lighting, heating and ventilating conditions. A balcony or mezzanine is often a suitable location, in that the attendant can look over the offices for locating employees.

6. The customer can purchase or lease from the Company chairs which are especially designed for P.B.X. attendant work and which are more comfortable for this purpose than the ordinary office chair. These chairs are furnished by the Company without added charge in connection with switchboards of two or more positions.

NOTE.—The 320-line board shown on Page 3 is equipped with eight regular cord circuits and a special cord circuit. The eight regular cord circuits are shown on the left of the key shelf and the special cord circuit on the right. The latter forms a part of Standard Wiring Plan No. 500 which is designed to provide a secrecy feature so that calls from extension stations equipped with a key arrangement may in effect be connected directly to a trunk circuit. When the special cord circuit associated with the No. 500 Wiring Plan is used, it is impossible for the P.B.X. operator to listen-in on the connection.





PRIVATE LINE MONITOR

Private Line Monitor

GENERAL

A PRIVATE LINE MONITOR is designed to terminate private lines of a customer that connect his branch offices with his main office; thereby relieving the main switchboard from this heavy inter-departmental traffic.

DESCRIPTION

The equipment is housed in an attendant's cabinet 1 foot 9½ inches long by 11¼ inches wide by 1 foot high. The standard finishes are oak and mahogany.

Standard desk telephones for one or two attendants are provided as desired. Hand telephones, however, are sometimes more convenient and may be used.

Visual drops are provided for all line signals. A buzzer can be associated with the visual drops for providing audible signals.

The cabinet can be placed on a desk or table. If it is necessary for the attendant to do other duties, a typewriter can be placed on the same desk or table.

CAPACITY

The cabinet is equipped with 17 keys and 15

visual drop signals. Fifteen keys are associated with private lines, the other 2 keys are for ringing circuits.

OPERATION

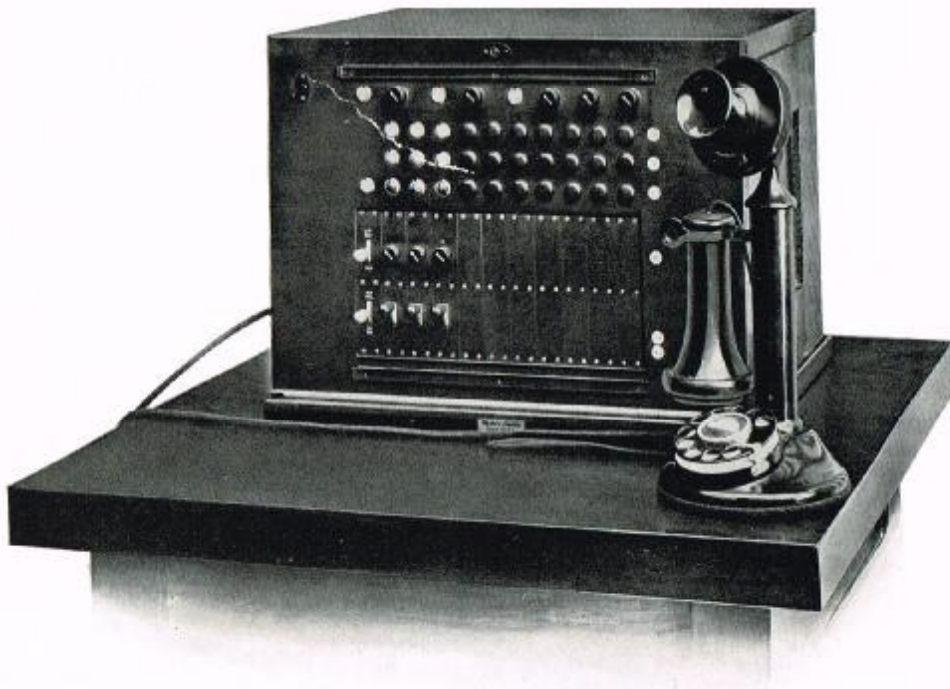
Incoming calls are indicated by line drop signals which are located above the line keys. The attendant answers the call by moving the associated key either up or down, the up-position being used by the first attendant and the down-position by the second attendant.

Intercommunication between circuits is not provided.

USES AND ARRANGEMENTS

The Private Line Monitor is used where rapid communication is desired over a group of private lines. It is used particularly by stock brokers to terminate at a central point the private lines connecting their various offices. Such businesses as automobile manufacturing concerns, radio studios, wholesale houses, etc., who have private lines for the transaction of company business, use the private line monitor instead of the main switchboard to terminate their private lines.





740-A DIAL P.B.X.
ATTENDANT'S CABINET

740-A Dial P. B. X. System

GENERAL

THE 740-A DIAL P.B.X. SYSTEM, which is similar in most respects to the other dial P.B.X. systems is designed for small dial installations of 88 or less extension station lines.

DESCRIPTION

An attendant's key cabinet, which can be placed on a desk or table, is required for distributing incoming trunk or tie line calls. Two key cabinets are required if more than 10 trunks are terminated at the 740-A installation. The cabinet is 1'3 $\frac{1}{4}$ " wide, 1'0 $\frac{1}{2}$ " deep, 1'0" high and weighs approximately 20 pounds. Standard finish is walnut on mahogany and the face is black fibre. Sample finish is shown in Section 13.

The dial equipment consists of an enclosed switch frame approximately 5' long, 2' wide and 7' high and a small compact power plant approximately 4' long, 1'8" wide and 7' high. Both the power plant and frame are enclosed and in considering the floor space required a clearance of about 3 feet should be allowed on all sides except that the cabinets may be placed end to end. The power plant can be operated with either direct or alternating current which is furnished by the customer.

Dial and busy tones, audible ringing signals and automatic ringing are provided.

CAPACITY

One hundred lines and trunks can be accommodated, one of which is used for the attendant's line and one for testing. The station capacity varies with the number of trunks and tie lines required, as follows:

Central Office Trunks (a)	Tie Lines (b)	Station Line Capacity (c)	Cabinets (d)
0 to 10	0	88	1
11 to 19	0	78	2
10 minus <i>b</i> *	1 Group	78	1
10 minus <i>b</i>	2 Groups	68	1
10 minus <i>b</i>	3 Groups	58	1
19 minus <i>b</i>	1 Group	68	2
19 minus <i>b</i>	2 Groups	58	2
19 minus <i>b</i> **	3 Groups	58	2

**b*—No. of tie lines.

**With 3 groups of tie lines maximum trunk capacity is 10.

OPERATION

Stations are equipped with dials and are connected to the dial equipment for intercommunicating and outgoing service.

Incoming calls on a central office trunk line or tie

line are answered at the attendant's cabinet. Connections through to the station are established by the attendant operating a key and dialing the station number. After the connection is established, no further attention to the call is required by the attendant. A call may be transferred to another station in the system by the attendant who is signaled from the called station by means of a supervisory lamp on the switchboard.

Central office connections are secured from the P.B.X. stations by dialing a code number (usually "0") which connects the station to the central office. From a dial central office the number wanted is then dialed at the station in the regular way. From a manual central office the central office operator will answer and complete the call.

Calls from stations normally restricted to intercommunication, to the general exchange system are handled by dialing the attendant and the convenience of the attendant's supervision on toll calls may thus be secured. The attendant selects an idle trunk which is indicated by the trunk lamps on the cabinet and after securing the called party dials the calling extension to complete the connection. The connection is automatically established as soon as the calling station answers.

The attendant's cabinet is arranged to facilitate night connections to as many stations as there are trunks. After the attendant has arranged a trunk and station for night service, it is unnecessary for the station to dial the trunk code to reach the central office. In connection with incoming calls, the extension station is signaled when ringing power is applied to the trunk at the central office.

Vacant terminals in the P.B.X. system are made busy and on calls dialed to vacant numbers, the busy signal is received.

USES AND ARRANGEMENTS

Dial private branch exchange service furnishes a faster means of establishing connection for intercommunicating and outgoing calls. Intercommunicating calls are established by two pulls of the dial in the case of the No. 740-A system. An outgoing trunk is secured by one pull of the dial. When a manual P.B.X. is used, the board attendant may not be able to give the best grade of service during peak hours, and intercommunicating and outgoing calls may receive slow answers. When a dial P.B.X. is used, a high grade of intercommunicating and outward service is maintained at all hours. Dial operation gives an instantaneous release of the equipment when the calling party hangs up. The faster connection and disconnection cuts down the line and trunk holding time, and makes for more efficient use of the equipment.

Since the attendant handles only the incoming

and special calls, such as toll calls, a saving in operating costs can be effected. This saving should be calculated in weighing the relative merits of a manual and dial installation. In an installation requiring two or more attendants where the average proportion of out and intercommunicating calls to the total traffic is well above fifty per cent, a saving of one or more attendants' time may be effected. This saving in operating costs increases as the number of stations increase; hence, this is an important feature in a growing business. In installations which can be handled by one attendant, a dial system will permit the attendant to give closer attention to the incoming calls. This feature is particularly desirable in businesses such as banks, legal offices, hospitals, etc.

Under dial P.B.X. operation, the customer obtains twenty-four hour outgoing and intercommunicating telephone service. This is of particular advantage in refineries, railroad shops and other businesses which maintain a sixteen or twenty-four

hour working force. In all businesses it is of value to the night watchman and employees working after hours. The same night service can be established as that provided on manual P.B.X. systems.

A single pair of wires is normally required from the switching equipment to each station and in connection with residence installations, this is an advantage over some other intercommunicating systems which require a rather large cable between stations.

The amount of equipment required varies with each installation, and this amount must be known before the plant engineers can determine exactly the amount of room and type of location needed. In general, basements are rarely suitable, because they are often subject to dampness. A dirt and moisture-proof room is desirable; hence, an inside room which is not suitable for office space is usually satisfactory. The equipment should be located as near the switchboard as possible for convenience and economy in cabling.



740-B Dial P. B. X. System

GENERAL

THE 740-B DIAL P.B.X. SYSTEM, which is similar in most respects to the 740-A Dial P.B.X. System, is designed for small dial installations of 38 or less extension lines and a total of not more than 10 central office trunks and tie lines.

DESCRIPTION

The attendant's key cabinet for the 740-B Dial P.B.X. is the same as that used for the 740-A Dial P.B.X. Systems. The standard finish is walnut on mahogany and the face is black fibre. Sample finish is shown in Section 13.

The dial equipment consists of a small, compact power plant of simple design which occupies a floor space 3'7 $\frac{1}{4}$ " long by 1'7" wide; and an enclosed frame 3'2" long by 2' wide and 7' high. In all other respects the features are the same as those used in the 740-A Dial P.B.X.

CAPACITY

The 740-B Dial P.B.X. System is arranged for a maximum of 10 central office trunks and tie lines

and 40 extension station lines. One of these extension station lines is assigned to the attendant and another is used for testing purposes so that the dial station line capacity is actually limited to a maximum of 38 stations.

OPERATION

The operating features are generally the same as for the 740-A Dial P.B.X. System except as hereinafter explained. The principal difference from the subscriber's standpoint is in the manner of dialing central office trunks and tie lines. Instead of dialing "0" to reach a central office trunk, the code "5" is dialed where there is only one group of trunks and no tie lines are provided. Where both trunks and tie lines are furnished, two digit codes are employed as, for example, dial "51" for the trunk group and "55" for tie lines.

USES AND ARRANGEMENTS

The same uses and arrangements are provided in the 740-B Dial System as have been explained under this heading for the 740-A Dial P.B.X. System.



740-C Dial P.B.X. System

GENERAL

THE 740-C DIAL P.B.X. SYSTEM is a small, dial system designed to provide improved telephone facilities for large residences where 38 or less extension lines and a total of not more than 4 central office trunks would be sufficient for the subscriber's requirements.

DESCRIPTION

The attendant's cabinet has been designed to be suitable in appearance for installation in large residences. The cabinet is semi-octagonal in shape and the key and lamp panel, together with base and rear panel, is made up in a separate unit so that the shell of the cabinet can be easily removed to permit access to the apparatus for installation and maintenance purposes.

The cabinet is available in two finishes, brown mahogany with the key and lamp panel and key handles finished in statuary bronze and with green lamp caps, or antique walnut with the key and lamp panel and key handles finished in old brass and with amber lamp caps. Sample finishes for the woodwork are shown in Section 13.

The dimensions of the cabinet are approximately 15" wide by 10" deep by 10" high. It can be mounted on a small table or in a niche in the wall suitably constructed to house it.

A hand set is usually provided for use with the attendant's cabinet. Hand sets are available in standard colors which conform with the finish of the cabinet.

The dial equipment consists of a small, compact power plant contained in a cabinet 3'7 1/4" long by 2' wide by 5' high; and an enclosed frame which is housed in a cabinet 3'6 1/4" long by 2' wide by 5' high. Both cabinets are finished in olive green.

CAPACITY

The 740-C Dial P.B.X. System is arranged for a maximum of 4 central office trunk lines and 40 extension station lines. One of these extension station lines is assigned to the attendant and

another is used for testing purposes so that the dial station line capacity is actually limited to 38 stations.

OPERATION

The operating features of the 740-C Dial P.B.X. System are the same as the 740-A P.B.X. System except that the code "5" is dialed instead of "0" to reach a central office trunk line. A secrecy feature is provided which makes it impossible for the attendant to listen in on any established connection.

Two attendants' cabinets may be provided for answering incoming calls at different locations. A key located at one of the cabinets transfers the operation from one cabinet to the other.

USES AND ARRANGEMENTS

The 740-C Dial P.B.X. System provides for a considerable number of stations, equipment arrangements suitable for residence installations with a minimum of attendance, and an attendant's cabinet designed to meet the appearance requirements of high-grade surroundings.

A feature of the 740-C Dial P.B.X. System which should appeal to owners of fine homes is that only a pair of wires is required from the switching equipment to each station, and there is thus less likelihood of marring expensive decorations than by the installation of the rather heavy cabling which the residence intercommunicating systems formerly required.

The secrecy feature should be an important consideration which might recommend this system to the occupants of large dwellings where servants would probably answer and transfer incoming calls.

While this system is designed primarily for residential use, some of its features may appeal to business concerns where their trunk line growth will never exceed 4 lines nor their extension line growth exceed 38 stations.





750-A DIAL
INTERCOMMUNICATING SYSTEM INSTRUMENT

August 1930

750-A Dial Intercommunicating System

GENERAL

THE 750-A DIAL INTERCOMMUNICATING SYSTEM is a small, standard, unattended system designed primarily for residential use in manual or dial Central Office Districts. The outstanding features of this system are: (1) Dial intercommunicating service; (2) Provision for originating, and answering and transferring central office calls at any or all stations connected to the system; (3) General improvement in appearance and reduction in size of station apparatus as compared with that previously used for residence systems; (4) Provision of such arrangements that on all types of connections other stations are locked out from the connections thus avoiding interference on conversations; (5) Provision of dial and busy tones, automatic ringing and audible ringing signal.

DESCRIPTION

All stations are dial equipped and intercommunicating calls are made by dialing. The use of certain push button keys is required in connection with both incoming and outgoing central office calls, and any or all stations may be equipped with these keys. Incoming calls may be answered and transferred at such key equipped stations which are called "Key Stations". The key equipment consists of three buttons for connecting the station to the trunk lines, one hold button, and one local button which is used when making intercommunicating calls. The trunk buttons are marked "1", "2" and "3", respectively, the hold button "H" and the local button "L". Each button is marked with a different color.

Stations not equipped with keys are called "Keyless Stations". They require but two wires to connect them with the switching equipment and are intended for use where it may be desired to provide only intercommunicating service or where the location of the telephone makes it undesirable to run a number of wires to it.

A small mahogany control cabinet may be provided at a key station so that keyless stations can be connected to the central office trunks through the key station. Each control cabinet has a capacity of three keyless station lines.

Stations in the system may be restricted from access to central office trunks either completely by providing no trunk connections to the station, or by partial restriction where supervised trunk connections can be secured through a key equipped control station, or where a key station is arranged so that incoming calls may be received and transferred but outgoing trunk calls cannot be made.

A hand set mounting having an appliqué base which contains the necessary keys is usually employed for the key stations. This hand set is

available in black and the five standardized colors. Desk or wall sets may also be used, in which case the keys are mounted separately and are similar to the five button keys used with wiring plans. A dial hand set without the appliqué base is usually used for the keyless station although dial, desk or wall sets may be used.

The switching equipment consisting mainly of relay apparatus, together with power equipment, with the exception of a rectifier, is mounted in an equipment cabinet having a sheet metal casing and door finished in olive green. Since in most instances it will be necessary to locate this equipment in small quarters, the equipment cabinet has been made as compact as practicable, the overall dimensions of the cabinet being 2'7" wide, 1'10" deep and 5' high.

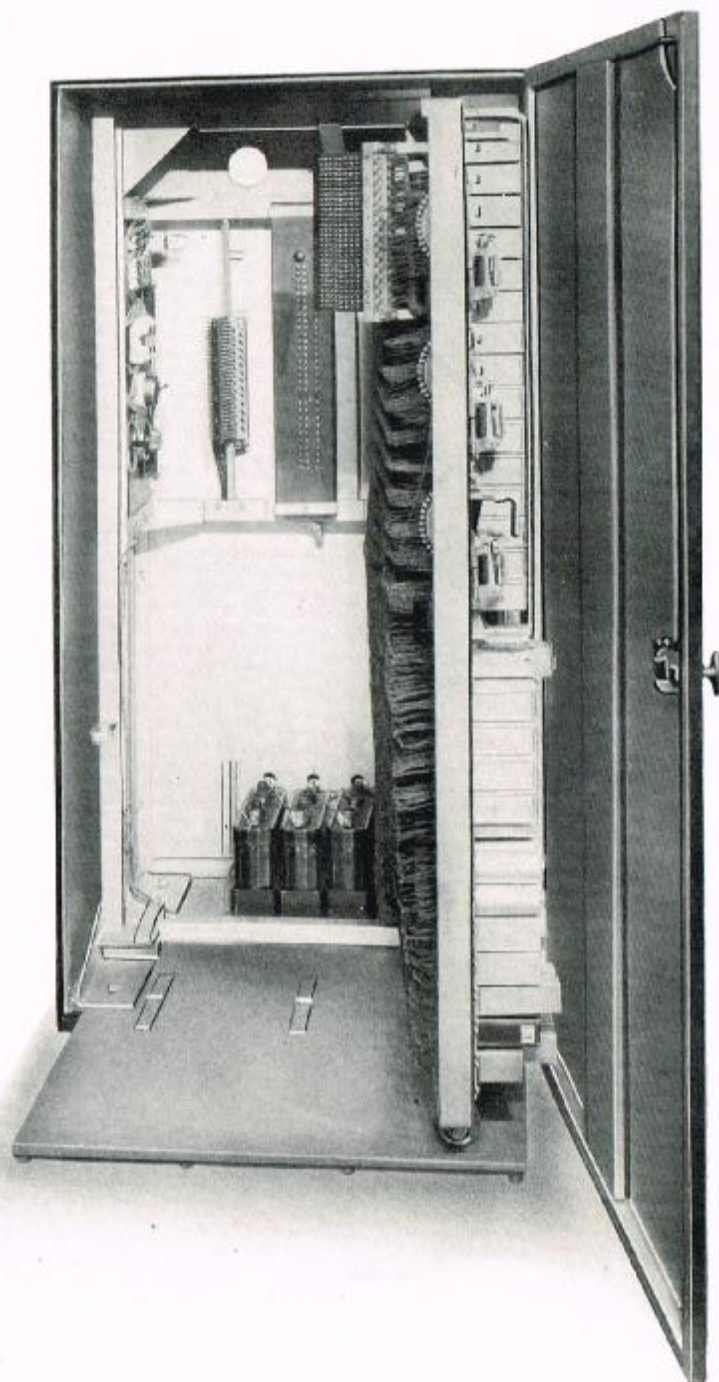
Each station is provided with a bell box, the ringer being used to indicate incoming intercommunicating calls. Two arrangements are available for indicating incoming central office calls. One arrangement similar to that now provided with the No. 1 Intercommunicating System consists of a different toned bell for each trunk limited to two bells per trunk. If desired, four bells common to all trunks with four trunk lamp indicators may also be provided. These trunk lamp indicators may be provided in the same color as the key station hand sets and contain three colored lamps which correspond to the color of the associated trunk key buttons. The trunk lamp indicators may be placed on a desk, table or on the wall and are 1³/₈" wide 3³/₈" deep and 1⁵/₈" high.

CAPACITY

This system has a capacity of 15 stations and 3 trunks. The switching equipment is available in two sizes, viz.: 15 stations and 3 trunks and 8 stations and 2 trunks. In the larger size there may be 3 and in the smaller size 2 simultaneous intercommunicating calls in addition to trunk calls.

OPERATION AT KEY STATIONS

Incoming central office calls are answered at any key station by depressing the proper trunk button. The button to be depressed is indicated either by the tone of the bell or by the color of the lamp, depending upon the signal arrangement provided. A central office connection may be held by depressing the "H" button if it is desired to make or answer another central office call or an intercommunicating call without releasing the first connection. If the incoming call is for another key station the trunk is held and the desired station is reached by means of an intercommunicating call and is told to take the call on the particular trunk



750-A DIAL
INTERCOMMUNICATING SYSTEM EQUIPMENT CABINET

August 1930

involved. The original station then hangs up and no further action at that station is required.

Outgoing central office calls are made from any key station by depressing one of the trunk buttons and then placing calls to a manual or dial central office in the usual manner. If the trunk selected is in use, a busy tone is received when the trunk button is depressed. Another attempt may then be made by selecting another trunk.

Intercommunicating calls are made from any station by depressing the "L" button and dialing the number of the desired station. Automatic ringing is employed and the calling party receives an audible ringing signal. The busy tone is received if the called station is in use. An intercommunicating call is answered by the called party by depressing the "L" button.

OPERATION AT KEYLESS STATIONS

All keyless stations are dial equipped and intercommunicating calls to other stations in the system are made by dialing directly.

Keyless stations connected to a control cabinet at a key station for connection through to the

general exchange system are required to dial the key station and give the person at the station the number desired. The keyless station then hangs up and after the call is completed at the key station, a talking key associated with the keyless station is operated and ringing power applied to the line with a second key. The key station cannot be used for other calls throughout the duration of the conversation to the keyless station. When the conversation is terminated, the talking key at the control cabinet is restored to normal.

Incoming calls for controlled keyless stations are completed from the controlling key station by operating the talking key associated with the keyless station and applying ringing power to the line with a second key. The same conditions then obtain at the key station as outlined in the preceding paragraph.

USES AND ARRANGEMENTS

The 750-A Dial System is particularly adapted for a city or suburban residence. It could, also, be used in a business where the future requirements will never exceed 15 stations and 3 trunk lines.





PAGE TYPE TELEPHONE TYPEWRITER

August 1930

Telephone Typewriter Service

GENERAL

TELEPHONE TYPEWRITER SERVICE is furnished for the transmission of typewritten messages by means of telephone circuits which connect machines known as telephone typewriters. The service is furnished under a special contract.

DESCRIPTION

The machines are furnished in five different types: (1) No. 12 page, sending and receiving; (2) No. 12 page, receiving only; (3) No. 14 tape, sending and receiving; (4) No. 14 tape, receiving only; (5) Automatic sending equipment.

The page machines print on a sheet or continuous roll 8½ inches wide. The tape machines print on a ¾ inch tape.

Each machine consists of a printer base on which are mounted the printer unit and either a receiving unit or a keyboard. The receiving unit is used when the station is to receive only and the keyboard unit when it is desired both to send and receive. The keyboard arrangement is similar to that of a typewriter. The letters are all capitals. The shift positions give figures, symbols, and punctuation marks.

The automatic sending equipment consists of a keyboard, which perforates a tape and a sending machine which sends the message over a line from the perforated tape.

All telephone typewriters are motor driven and can be operated from 110 volt power supply, either A.C. or D.C. In the case of 110 volt A.C. a motor generator shown under the table in the cut is provided without charge whenever necessary. The type bars on the machines operate in response to telegraphic impulses received over the wires.

CAPACITY

Telephone Typewriter Service can be provided for: (1) One-way transmission, i.e., one sending machine and one or more receiving machines; (2) Both-way transmission, i.e., two or more machines which can receive and send; (3) Duplex operation, i.e., sending and receiving messages simultaneously over the same wire.

The machines are set for a speed of forty or sixty words per minute. High speed service of sixty words per minute will cost somewhat more under certain conditions.

OPERATION

The message is typed the same as on a typewriter, except that on page machines the paper is automatically moved up by pressing a key, and the carriage is automatically moved from left to right by pressing another key.

With page machines, if the operator discovers a mistake on the same line on which she is writing, any or all of the line can be blocked out and re-written.

Paper is inserted as in a typewriter, either by sheets, or preferably on a roll. With proper paper, as many carbons can be made with either the sending or receiving machine as are made with the typewriter.

Positive drive platen roll equipment is available where it is desired to have accurate registration on a printed form both at the sending and receiving station or to print on continuous forms where the receiving station is not closely attended. This equipment secures uniformity in the line feed by the use of projections on the platen roll which engage with perforations along the edge of the prepared paper forms.

The motors are cut off when the message is finished. If the motor should be left running a while after the message is finished, no harm is done.

Remote control features which permit a machine to stop and start other machines on the circuit may be provided to meet individual conditions. The provision of remote control in some instances necessitates additional circuit facilities.

Telephone typewriter switchboards can be provided for intercommunication between systems and between different circuits in a single system. The requirements in each case must be considered individually.

USES AND ARRANGEMENTS

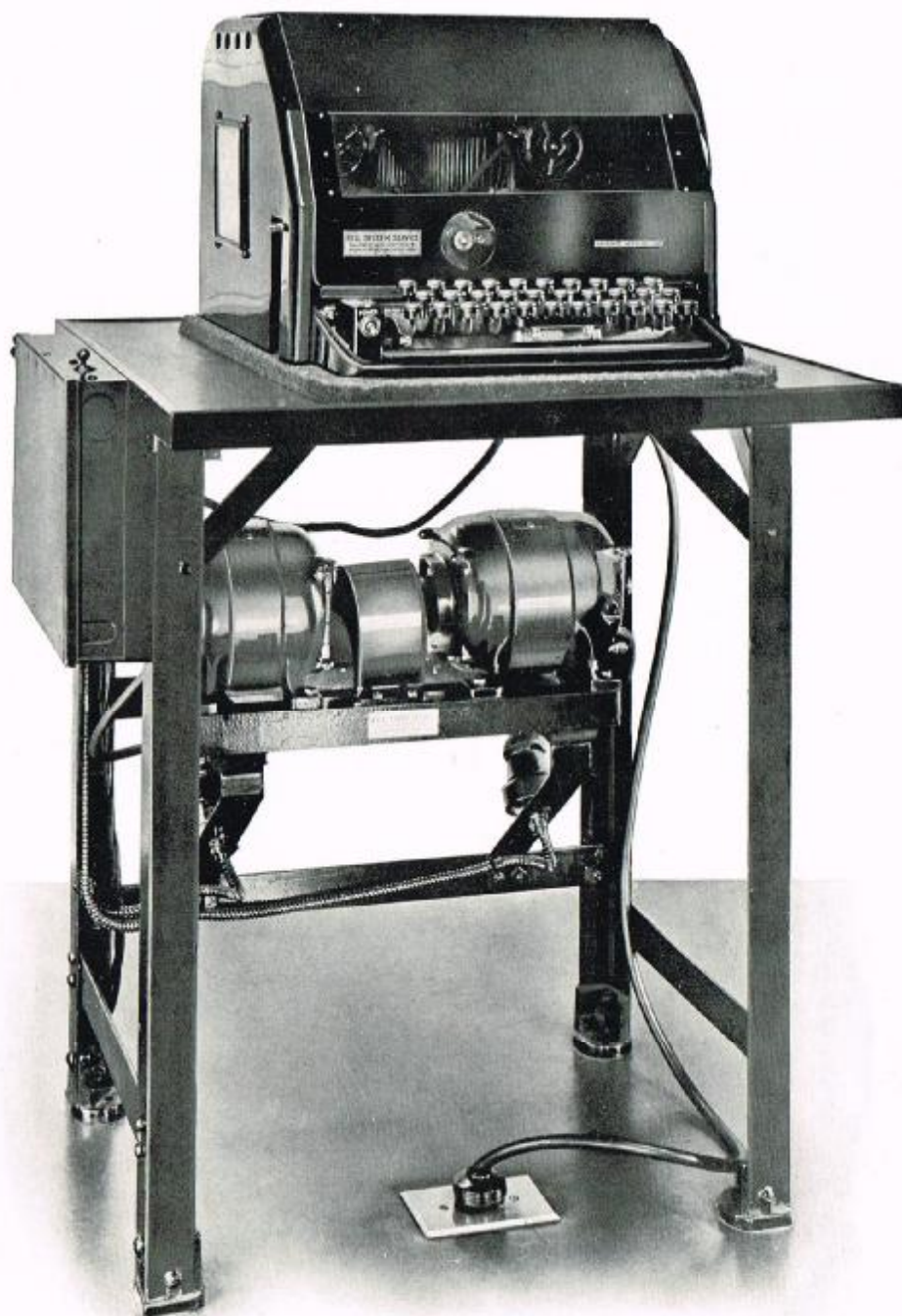
Telephone Typewriter Service saves time by instantaneously transmitting messages to one or more points. For example, cotton, grain and stock brokers use this service for issuing buying and selling orders to all of their agents simultaneously.

Hotels transmit messages to the accounting department, information clerks, mail clerks, housekeepers, P.B.X. attendants and the head porter, thereby facilitating guests who check out hurriedly, and permitting the rapid preparation of rooms for incoming guests.

Police departments use the service for sending out simultaneous messages to all district headquarters for the apprehension of criminals and for assembling emergency squads.

Railroads use this service between the freight office and the yards for spotting and demurring freight cars.

Manufacturers transmit orders to the warehouse for shipping and to the credit department for credit rating, simultaneously. The order is filled while the rating is inspected. The credit department



TAPE TYPE
TELEPHONE TYPEWRITER

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notifies the warehouse of the rating before the shipment is made.

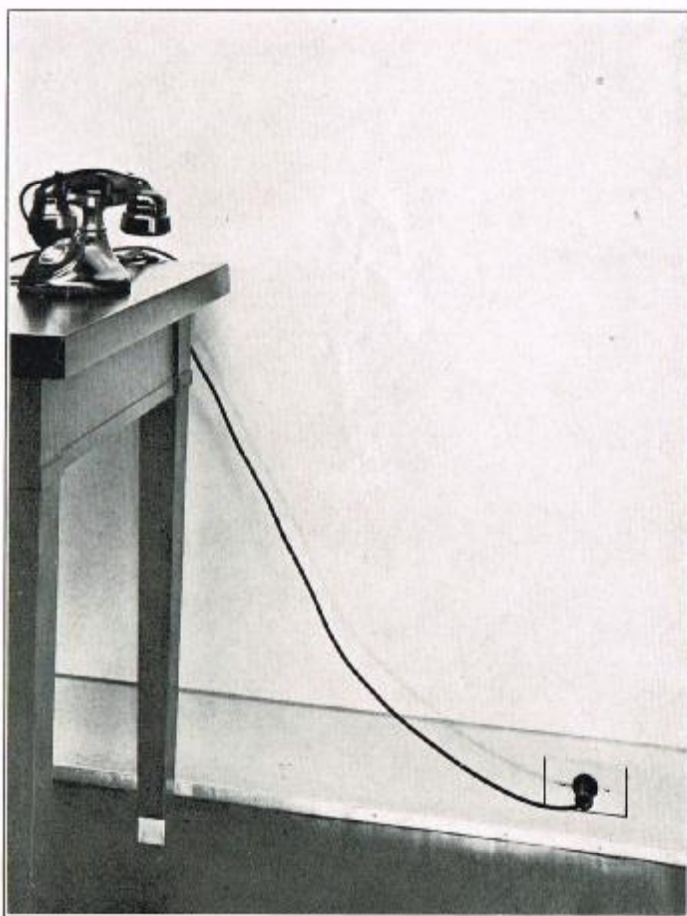
The telephone typewriter provides the accuracy and authority of the printed word. A written record is made at both the sending and the receiving ends. The messages can be checked for accuracy as they are being sent. The responsibility for accuracy rests with the sender, whereas under Morse (telegraph) operation, for example, the responsibility for accuracy is divided between the sender and receiver.

The telephone typewriter cuts correspondence costs. With the use of the telephone typewriter, there is no necessity of confirming letters. Much information, which is normally transmitted by letter, can be sent by telephone typewriter at a lower office cost.

The telephone typewriter is economical to operate. Any stenographer or typist can operate the telephone typewriter. Clerks can easily and quickly learn to operate it. No attention other than starting and stopping the motor is required at the receiving end.

The Telephone Typewriter Service provides a means of closer supervision between the headquarters and branch offices. Matters of importance may be referred instantly to the headquarters for decision. The headquarters can be kept informed on unexpected happenings, such as delays and breakdowns, and take full advantage of such information. The manager can be kept informed on details which are essential for close and proper supervision of the business. Reports can be sent in daily.





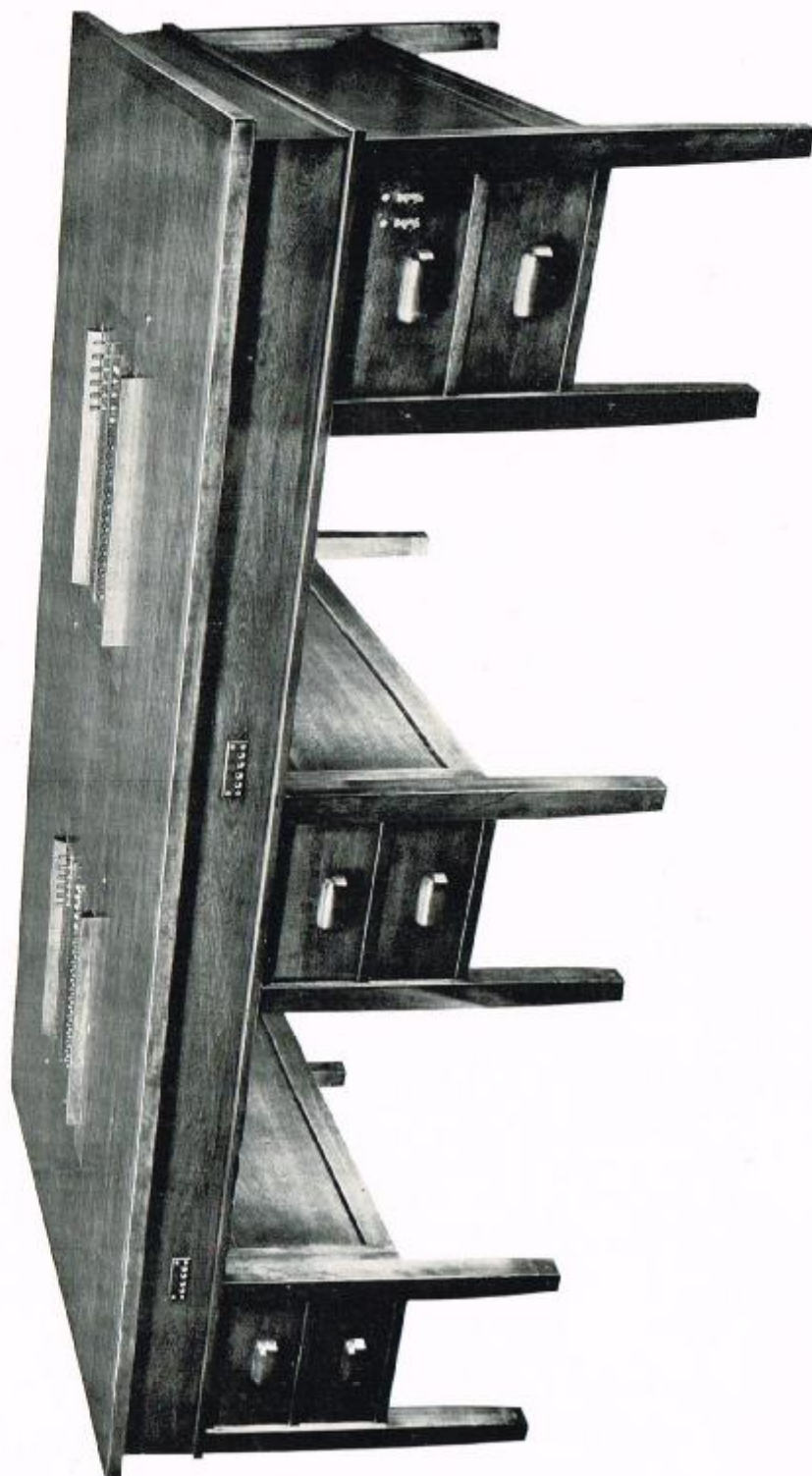
PORTABLE JACK AND PLUG EQUIPMENT

Portable Telephone Equipment Jack and Plug

PORTABLE TELEPHONE EQUIPMENT, either hand telephone or desk set, may be used for connecting to a central office extension or P.B.X. extension line. The station wiring is terminated on mounted spring jacks or wall outlets, either flush or non-flush types being used (flush type shown) and the cord of the portable telephone is terminated in a plug. Where a flush type outlet is used, the subscriber is required to furnish the outlet box and cover plate. When main station service only is provided jacks are confined to the same or adjoining rooms. Jacks for use in connection with P.B.X. or extension lines may be located at any point on the

subscriber's premises within hearing distance of station or extension bells permanently bridged to the line (maximum bells per line, four). It is required that a bell box and associated equipment be permanently bridged to each line. The customer is required to pay for at least one telephone station, either permanently connected or portable, for each extension line equipped with jacks. Portable telephones are convenient for guest rooms and dining rooms of houses; they are convenient in lounging rooms and dining rooms of clubs and hotels; they permit telephone service in each room of hospitals without having an instrument continually in the room.





20-LINE ORDER RECEIVING TABLE

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20-Line Order Receiving Table

GENERAL

THE 20-LINE ORDER RECEIVING TABLE provides for the prompt handling of a large number of incoming calls. Its functions are similar to those of the No. 2 Order Turret, the principal differences being: (1) That the flush type equipment is operated with keys instead of cords; (2) That the equipment is flush with the surface of the table in which it is installed.

DESCRIPTION

The equipment is mounted flush with the top of a table furnished by the Telephone Company as an integral part of the equipment. The table is equipped for use by four attendants, and has dimensions of 8'0" by 4'0". Four rows of keys are provided with one line lamp and one busy lamp for each two keys. A limited number of private line stations for communicating with the table may be connected as special equipment, in which case a ringing key is provided. No provision is made for connecting such stations through the table to a P.B.X. or the central office. An operator's set consisting of a chest transmitter and single head receiver is furnished at each position. The tables are available finished in mahogany on birch, walnut on mahogany, dark oak on red oak and golden oak on white oak. Sample finishes are shown in Section 13.

CAPACITY

Each original section is equipped for four attendants. Additional two-position sections, with dimensions of 3'4" by 4'0" may be installed for multiple operation. The maximum capacity of an installation is 12 positions with 20 lines.

OPERATION

The operation is by means of keys. Each key has three positions: normal, talking and holding. An incoming call lights the answering lamp associated with the line. If several tables are multiplied, an answering lamp lights at each. The call is answered at any table by placing the associated key in the talking position, which extinguishes the answering lamps and lights the busy lamps associated with that line at each table. A line can be held by throwing the key to the holding position, the busy lamp continuing to burn. The held line can be picked up by throwing the key again to the talking position. At the termination of the conversation, the key is restored to normal.

An outgoing connection is established by throwing the key of an idle trunk or line to the talking position. If the table is operated, directly or indirectly, from a dial central office, the answering station or stations can be equipped with a dial for outdialing. If the operator's set is used, the dial can be mounted on the table. A buzzer may be connected with the table to provide an audible signal for incoming calls.

USES AND ARRANGEMENTS

The Order Receiving Table serves the same general purposes as does the No. 2 Order Turret. Some customers consider that the table presents a neater appearance than does the turret.

The same special monitoring equipment and combinations of P.B.X. lines and central office trunks can be provided as are provided for the No. 2 Turret.





NO. 1 ORDER RECEIVING TURRET

No. 1 Order Receiving Turret

GENERAL

A NO. 1 ORDER RECEIVING TURRET is designed to facilitate the reception of orders by employees who are in separate locations, or whose work is varied. It combines, in a small cabinet, facilities for selecting and holding either a two-way or a one-way line and creating a busy signal on a two-way line. It has a visible signal for incoming calls.

DESCRIPTION

The equipment is housed in a black cabinet 8 inches wide, by 8 inches long, by 9 inches high, which has (1) Two keys for holding the two lines; (2) A busy test key for diverting calls; and (3) A line lamp on the face for indicating incoming calls. With the "busy test" key is combined a battery cut-off feature. A desk stand or a chest set can be furnished. Through dialing can be provided, if the set is indirectly connected to a dial central office. If the chest set is used, the dial is mounted on the table or desk on which the turret is located.

OPERATION

Depressing the left-hand key holds a call on the two-way line; depressing the right-hand key connects the one-way line for talking. The busy test and battery cut-off key turned one way puts a "busy" on the two-way line; and turned the other way, cuts the battery off the line lamp.

USES AND ARRANGEMENTS

The No. 1 Order Receiving Turret is adapted for

businesses such as light, gas, and water companies, newspapers, laundries, cleaners, coal companies, dairies, lumber yards, etc., which receive calls that can be handled by any one of several employees.

The use of the busy test feature permits directing the incoming calls to only those telephones at which there is someone to answer. This speeds up the answering time on all calls (answering time should be under five seconds), which effects the equivalent of a substantial increase in personnel and central office trunks. This is in addition to the value of rendering to the person calling faster and more satisfactory service.

The turret should be confined to operation from a P.B.X., as it is undesirable to tie up a central office trunk when an employee is away from his desk. If the subscriber does not have a P.B.X., other types of order receiving equipment are more suitable.

The line holding feature permits the employee to hold the two-way line and call out on the one-way line for information, etc., and return to the two-way line to complete the call. Both lines can be held and conversations can be carried over them alternately.

The cabinet must be fastened securely to the desk. Usually a hole is drilled in the center of the desk and the set is both wired and fastened from underneath. If the customer objects to this, it can be fastened to a board which is secured to the right-hand edge of the desk.





NO. 2 ORDER RECEIVING TURRET

August 1930

No. 2 Order Receiving Turret

GENERAL

THE NO. 2 ORDER RECEIVING TURRET is designed for fast and convenient handling of a large number of incoming calls, such as orders, requests for information, etc. Its more important features include access by several attendants to the entire group of incoming trunks so that calls may be evenly distributed and promptly handled.

DESCRIPTION

The No. 2 Order Turret is 4 feet long, 1 foot 1 inch wide, by 1 foot 3 inches high. It is available finished in walnut or mahogany and golden oak or white oak. Sample finishes are shown in Section 13. It is installed on a table furnished by the customer or by the Telephone Company, if requested. Each turret has working space for four attendants. The incoming lines and necessary keys and cords for two attendant positions appear on each side. The lines to the turret may be from a P.B.X. or from a central office. In the latter case, the central office trunks may appear at both the turret and a P.B.X., i.e., multiplied to both.

In case the central office trunks appear at both the turret and the P.B.X., line signals for them may be or may not be provided at the P.B.X., as is desired. If the central office trunks have been multiplied to permit the transfer of calls intended for the P.B.X. but misdirected by the person calling to the turret, these trunks at the P.B.X. need not be equipped with line lamps. A turret attendant can inform the P.B.X. operator by means of a call circuit, what trunk to select. These call circuits between the turret and the board terminate on station line jacks at the P.B.X.

No intercommunication features are provided.

When the turret operates, either directly or indirectly, from a dial central office, dials mounted on the table are provided for through dialing.

One side of the turret (in group installations only the first turret) is arranged for terminating five station lines for order receiving during busy periods, or for order solicitation. At the turret these station lines appear as single cords which can be connected to any line. A key and combined line and supervisory lamp are provided for each such station line.

Two cords are provided for each attendant so that a connection may be held on one cord while the attendant is talking over the second cord.

An audible signal which may be cut in or out may be provided.

A conference circuit can be provided for setting up a three-way conversation over a turret line, a P.B.X. line and a central office trunk.

Each turret is arranged for a maximum capacity of forty lines, but as relay equipment is provided in each turret for only ten lines (P.B.X. or central

office) four turrets are necessary before each turret can be filled to its forty-line capacity. It is possible to terminate 40 lines in a single turret by providing a special auxiliary cabinet for housing additional equipment.

A P.B.X. or central office line may be multiplied to as many as six turrets. If it should be multiplied to more than six, the additional appearances would have to be without line and busy lamps, as a maximum of twelve line and busy lamp appearances may not be exceeded. When more than forty lines are required, they can be divided into groups in the most convenient answering arrangement. They must be divided so that the number of lines does not average more than 10 per turret, and the number of lamp appearances is not greater than 12 per line.

OPERATION

An incoming call lights the line lamps associated with the line. The call is answered by an attendant on either side of the turret (or on either side of any turret on which the line appears) establishing a connection with one of the two cords available at her position.

When the call is answered, the white line lamp is extinguished and the red busy lamp lights and continues to burn until the connection is taken down.

When an incoming call is passed to one of the five stations which may be available for overflow or special calls, it is necessary that the receiver be removed from the hook at the station before the connection to it is made.

USES AND ARRANGEMENTS

The table for the turret is furnished by the customer or by the Telephone Company if requested. It should be wide enough to give the attendants ample room for writing orders or doing any other clerical work pertinent to their work at the turret; it should not be so wide as to cause the attendants any difficulty in reaching the cords or keys. The table can be constructed so that a typewriter may be placed in front of and below the answering jacks; or a typewriter can be placed alongside of the table on a desk or swinging stand.

Considered generally, a single telephone number and, therefore, a single group of central office lines, is desirable. The public becomes accustomed to a single number, and to the conception of a business as a unified organization easily approachable through that number.

Under some circumstances, however, separate trunk groups for the customers' P.B.X. and order turret are advantageous, and the considerations involved should be carefully weighed, to determine what arrangement will be the best under the cir-

circumstances. For example, under the following conditions separate trunk groups to the turret are of advantage: (1) If incoming calls to the other departments have peak periods which would block incoming orders; viz., newspapers which receive information calls following public events, disasters, etc., which might block calls on a single trunk group, intended for the classification advertising department; (2) In installations in which the public distinguishes between the departments and will place the calls properly; viz., the police department of a city; (3) If the calling rate to a turret is heavy, and a substantial saving is made in operating costs and time by the calls being directed straight to the turret; viz., telegram receiving department of a telegraph company, business offices and repair departments of public utilities, etc.

Generally, provisions should be made so that, where there is a separate group of trunks to the turret, calls which are misrouted to the P.B.X. or the turret may be rerouted without requesting the customer to hang up and place another call. This can be done for calls misdirected to the P.B.X. by using P.B.X. lines to the turret; and for calls misdirected to either the turret or the P.B.X. by having the central office lines of each board multiplied to the other, and using a P.B.X. line to the turret for a call circuit.

For answering calls to the turret at the P.B.X. at night or on holidays, the central office lines to the turret multiplied at the P.B.X. can be equipped with line lamps.

A single trunk group multiplied to both the P.B.X. and the turret and provided with line lamps at each is advantageous if most of the calls are for the turret; as is often the case with taxi companies, laundries, small telegraph offices, groceries, automobile service companies, etc. Under this arrangement, the P.B.X. operator can assist the turret attendants in taking orders during peak hours. Calls are answered at both the P.B.X. and turret. If a call is picked up at the turret which is intended for the switchboard, it is referred back to the P.B.X. attendant. Under such an arrangement, the board and turret should, if possible, be placed alongside each other. The P.B.X. operator may be able to handle all of the orders during slack periods, thus permitting the turrets to be unattended.

A single group of incoming central office trunks to the switchboard with P.B.X. lines to the turret is suitable for all installations other than those discussed. Under this arrangement, non-listed central office lines may be provided to the turret for placing outgoing calls in order (1) to eliminate double handling of outgoing calls; (2) to eliminate unnecessarily tying up the P.B.X. facilities.

The turret facilitates rapid handling of calls.

Incoming calls are indicated at several positions, and can be answered from any one of these positions. The answering time on calls to the turret should be well under five seconds. The saving effected by the faster and more efficient handling of calls has been estimated in many installations as the equivalent to a twenty per cent increase in personnel and equipment. The faster service is also of importance, inasmuch as the answering time directly affects the attitude of the person calling, both during the conversation and later.

The turret offers flexibility for handling variable loads. Additional attendants can be used for handling peak loads. These attendants can be delegated to other work, such as filling orders received, handling mail orders, or originating calls during slack periods.

The turret enables the customer to centralize incoming calls. Incoming calls distributed to the various departments over the customer's premises may not receive proper attention because the employees in the particular department are busy or feel no responsibility for handling them. This results frequently in delayed answers, during which the person calling may get impatient and hang up. If it is necessary for the person calling to deal with more than one department during the conversation, the calls must be transferred, which causes additional delay and longer trunk holding time.

The attendants are all in one location, where the handling of calls can be supervised. As an incoming call which is not answered is indicated by a white lamp and an answered or outgoing call by a green lamp, the supervisor can look at the turret and determine the number of unanswered calls, the number of conversations being carried on, and the speed of the answer. The attendants, being engaged chiefly in handling telephone calls, can be instructed in the proper telephone technique. The information gathered by the use of a monitoring cabinet can be used for instructing and correcting the attendant.

Special supervisory equipment for monitoring both sides of the conversation can be provided. This equipment usually involves circuit design and special arrangement requiring consideration of each case individually. The cabinet containing the equipment has two rows of lamps, which can be associated with the lines. When a call comes in, one lamp lights. When it is answered the other one lights and burns until the line is disconnected. A headset and plug for selecting lines are used by the monitor.

The monitoring equipment can be associated with the attendants' answering sets instead of the lines. Under this arrangement the monitor can more closely observe the work of particular attendants, but cannot observe the speed of answer.



Golden Oak on White Oak



Mahogany on Birch



Dark Oak on Red Oak



Walnut on Mahogany



Antique Walnut



Brown Mahogany

NOTE: The finishes shown are reproductions of actual samples, and approximate the exact finishes within the limitations of letter-press printing.

